QUALITY AND YIELD OF ONION GROWN BY SETS AS AFFECTED BY DIFFERENT IRRIGATION REGIMES UNDER ASSUIT CONDITIONS
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ABSTRACT
This work was carried out to improve the quality and yield of Onion Giza 6cv. that grown by sets. Sets were grown on September 12 and 16 in 2006/2007 and 2007/2008 seasons, respectively. Plants were subjected to irrigation treatment intervals. Results showed that, increasing the period between irrigations led to a significant reduction in percentage of double bulbs. Application of irrigation later in the growing seasons gave a simultaneous increase in total yield. Plots that received 4 irrigations, gave the lowest weight loss.

INTRODUCTION
Onion (Allium cepa) is one of the most important vegetable crops in Egypt. The quality of onion that grown by sets wants to improve. So we are modifying our traditional culture practices such as applying different irrigation regimes in order to reach proper bulb quality for consumption and to improve yield and storability of onion. Orta and Ener (2001) indicated that the yield and yield components in bulbs were affected by irrigation. Halim and Ener (2001), Kumar et al. (2007) and Enciso et al. (2009) found that irrigation highly affected the total onion yield, yield components and morphological characteristics of onion bulb.

MATERIALS AND METHODS
The present work was carried out at the Experimental farm of the faculty of Agriculture, Assiut University, Assiut during 2006/2007 and 2007/2008 seasons. The soil of the farm was clay. Onion Giza 6cv. was used in this work. Sets were grown on September 12 and 16 in 2006/2007 and 2007/2008 seasons respectively. Sets were grown on rows of 3.5 m long and 50 cm wide at 5-7 cm between plants and sowing were at two sides of row. Three rows were included in each plot. After 30 days from sowing sets, plants were subjected to irrigation treatment intervals, i.e., 15, 21 days as follows:

1- Plots were irrigated at 2-weeks interval until 15 January (received 8 irrigations), then plant left without irrigation until maturity.
2- Plots were irrigated at 2 weeks interval until 30 December (received 7 irrigations), then plants left without irrigation until maturity.
3- Plots were irrigated at 2-weeks interval until 15 December (received 6 irrigations), then plants left without irrigation until maturity.
4- Plots were irrigated at 3-weeks interval until 22 January (received 6 irrigations), then plants left without irrigation until maturity.
5- Plots were irrigated at 3-weeks interval until 2 January (received 5 irrigations), then plants left without irrigation until maturity.

6- Plots were irrigated at 3-weeks interval until 15 December (received 4 irrigations), then plants left without irrigation until maturity.

The water requirement in all treatments was constant (0.4 m³/plot) in each time and was calculated by water meter. All treatments were harvest when reached maturity i.e. when about 75% of the vegetative part plants were fall down. Irrigation treatments were arranged in Randomized Complete Block Design with three replicates.

Data records:
When about 75% of vegetative part plants in each plot were fall down, plants that showed annual bolting in each plot were discarded. Then harvesting was done by digging. Ten plants were randomly taken from each plot on which the following data were recorded and averaged.

1- Plant height (cm):
Measured from the base of the bulb neck to the top of the longest leaf blade.

2- Fresh weight of whole plant (gm):(F.W.of whole plant)
After harvesting, bolters were discarded and bulbs were left for curing for about 15 days before cutting off dry leaves and roots. The following characters were recorded:-

3- Percentage of doubles (%):
Percentage of double bulbs were estimated as number of external doubling (split bulbs)/number of planted set.

4- Total yield (ton/ fed):
All harvested bulbs in each plot were weighed and bulb yield/fed. was calculated.
After classification, Random samples of 20 single bulbs from each plot were used for the determination of:-

5- Bulb diameter (cm):

6- Average bulb weight (gm):
The twenty single bulbs were weighed and averaged.

7- Total soluble solids TSS (%):
Five bulbs were randomly taken from each plot, cut and mixed together after removing the outer 2 leaves. The percentage of total soluble solids was measured by refractometer.

8- Weight loss:
Fifteen bulbs were randomly taken from each plot. The storage period started after harvesting till the fifth of December and the weight loss during storage was calculated.

Statistical analysis:
Data were subjected to statistical analysis according to Snedecor and Cochran (1980) and means of treatments were compared using L.S.D.
RESULTS AND DISCUSSION

1- Plant height (cm):
Data presented in (Table 1), showed that, plots received eight or seven irrigations at 2 weeks interval showed the highest plant height. It could be, generally noted that, the highest number of irrigations received, the highest plant height will be obtained. Application of irrigation later in the growing seasons gave a simultaneous increase in plant height. For example, in the first season, withholding irrigation as early as January,15, the average of plant height was 68.33 cm but when we stopped irrigation treatment 45 days before harvest, the average of plant height was 61.58. These results are in line with Basilious (1975) who indicated that, an increase in foliage growth with higher moisture levels.

2- Fresh weight of whole plant (gm):
Data on fresh weight of whole plant as affected by irrigation treatments are shown in Table (1). It could be generally, noted that, plots received eight irrigations at two weeks interval up to January,15 gave the highest value of plant fresh weight. Plots which received 8 or 7 times of irrigations showed significantly higher fresh weight of whole plant.

3- Percentage of double bulbs: (
Results presented in Table (1) indicated that, application of irrigation later in the growing season gave a simultaneous increase in percentage of double bulbs. On the other hand, by increasing the period between irrigations a significant reduction in percentage of double bulbs was noted. These results agree with Hassan(1984) who indicated that, shortening the irrigation interval increased bulb doubling.

4- Total yield:(ton/fed.)
Total yield (ton/fed.) was significantly affected by the tested irrigation treatments (Table 1). Plots received 8 irrigations at 2 weeks interval gave significantly higher total yield comparing with the other treatments in both seasons. Application of irrigation later in the growing season gave a simultaneous increase in total yield. These results are in agreement with Orta and Ener (2001) they indicated that the yield and yield components in bulbs were affected by irrigation. Halim and Ener (2001), Kumar et al. (2007) and Enciso et al. (2009) found that irrigation highly affected the total onion yield, yield components and morphological characteristics of onion bulb. Irrigation at 2 weeks interval, led to increase of the root-zone water storage, better crop, water availability through the whole root zone and higher yields.

<table>
<thead>
<tr>
<th>Irrigation treatments</th>
<th>Plant height (cm)</th>
<th>F. W. of whole plant (gm)</th>
<th>Double (%)</th>
<th>Total yield (ton/fed.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 irrigations at 2 weeks interval until 15 Jan.</td>
<td>68.33</td>
<td>255.56</td>
<td>2.87</td>
<td>14.920</td>
</tr>
<tr>
<td>7 irrigations at 2 weeks interval until 30 Dec.</td>
<td>68.20</td>
<td>248.63</td>
<td>2.20</td>
<td>11.360</td>
</tr>
<tr>
<td>6 irrigations at 2 weeks interval until 15 Dec.</td>
<td>61.58</td>
<td>179.57</td>
<td>1.80</td>
<td>12.320</td>
</tr>
<tr>
<td>6 irrigations at 3 weeks interval until 22 Jan.</td>
<td>60.93</td>
<td>170.23</td>
<td>2.29</td>
<td>12.880</td>
</tr>
<tr>
<td>5 irrigations at 3 weeks interval until 2 Jan.</td>
<td>60.10</td>
<td>166.60</td>
<td>1.67</td>
<td>9.350</td>
</tr>
<tr>
<td>4 irrigations at 3 weeks interval until 15 Dec.</td>
<td>54.31</td>
<td>164.51</td>
<td>1.71</td>
<td>8.200</td>
</tr>
<tr>
<td>L.S.D 0.05</td>
<td>2.96</td>
<td>20.32</td>
<td>0.49</td>
<td>2.030</td>
</tr>
<tr>
<td>2007/2008 season</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 irrigations at 2 weeks interval until 15 Jan.</td>
<td>67.20</td>
<td>226.73</td>
<td>2.97</td>
<td>11.470</td>
</tr>
<tr>
<td>7 irrigations at 2 weeks interval until 30 Dec.</td>
<td>68.20</td>
<td>208.03</td>
<td>2.40</td>
<td>9.010</td>
</tr>
<tr>
<td>6 irrigations at 2 weeks interval until 15 Dec.</td>
<td>61.26</td>
<td>170.83</td>
<td>2.17</td>
<td>10.750</td>
</tr>
<tr>
<td>6 irrigations at 3 weeks interval until 22 Jan.</td>
<td>61.70</td>
<td>168.90</td>
<td>2.20</td>
<td>10.360</td>
</tr>
<tr>
<td>5 irrigations at 3 weeks interval until 2 Jan.</td>
<td>57.80</td>
<td>154.40</td>
<td>1.96</td>
<td>7.560</td>
</tr>
<tr>
<td>4 irrigations at 3 weeks interval until 15 Dec.</td>
<td>54.56</td>
<td>153.43</td>
<td>1.52</td>
<td>6.820</td>
</tr>
<tr>
<td>L.S.D. 0.05</td>
<td>2.86</td>
<td>18.92</td>
<td>0.20</td>
<td>0.893</td>
</tr>
</tbody>
</table>

5- Bulb diameter (cm):
As shown in Table 2, it was found that, plots that received 8 irrigations gave the highest bulb diameter. These results agree with Abdulaziz and Al-Harbi (2002) who indicated that average bulb diameter was significantly increased at higher levels of irrigation water. Assuming high irrigation frequency, better scheduling may be expected to increase applied fertilizer use efficiency, to reduce leaching and improve onion yields by increasing bulb size.

6- Average bulb weight (gm):
Data presented in Table 2 showed that, average bulb weight was increased when the period between the irrigation decreased. On the other hand, the average bulb weight was increased by increasing the number of irrigations.
and when the application of irrigation continued later in the growing season. For example, plots that received 6 irrigations and were irrigated until Jan. 22 achieved higher average bulb weight than plots that received 6 irrigations and were irrigated until Dec. 15. Abdulaziz and AL-Harbi (2002) indicated that average bulb weight was significantly increased at higher levels of irrigation water.

7- Total Soluble Solids TSS (%):
Results presented in Table 2 indicated that, the highest value of TSS was obtained by increasing the period between irrigations. Plots that received 4 irrigations gave the highest value of TSS.

8- Weight loss (gm):
Plots that irrigated at 3- weeks interval until 15 December (received 4 irrigations) gave the lowest weight loss, so it achieved the highest storability (still good without rotting or sprouting for long time). Bhonde et al (1996) indicated that, the effect of withholding irrigation for 12 days prior to harvest, followed by 3 days curing, resulted in lower storage losses compared with later irrigation and longer curing times.


<table>
<thead>
<tr>
<th>Irrigation treatments</th>
<th>Bulb diameter (cm)</th>
<th>Average bulb weight (gm)</th>
<th>TSS (%)</th>
<th>Weight loss (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006/2007 season</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 irrigations at 2 weeks interval until 15 Jan.</td>
<td>6.37</td>
<td>104.450</td>
<td>13.00</td>
<td>0.816</td>
</tr>
<tr>
<td>7 irrigations at 2 weeks interval until 30 Dec.</td>
<td>6.26</td>
<td>94.550</td>
<td>14.33</td>
<td>0.750</td>
</tr>
<tr>
<td>6 irrigations at 2 weeks interval until 15 Dec.</td>
<td>5.97</td>
<td>80.220</td>
<td>15.91</td>
<td>0.716</td>
</tr>
<tr>
<td>6 irrigations at 3 weeks interval until 22 Jan.</td>
<td>6.04</td>
<td>89.510</td>
<td>13.16</td>
<td>0.616</td>
</tr>
<tr>
<td>5 irrigations at 3 weeks interval until 2Jan.</td>
<td>5.87</td>
<td>88.440</td>
<td>15.50</td>
<td>0.566</td>
</tr>
<tr>
<td>4 irrigations at 3 weeks interval until 15 Dec.</td>
<td>5.62</td>
<td>76.110</td>
<td>17.41</td>
<td>0.400</td>
</tr>
<tr>
<td>L.S.D 0.05</td>
<td>0.26</td>
<td>7.949</td>
<td>1.16</td>
<td>0.079</td>
</tr>
<tr>
<td>2007/2008 season</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 irrigations at 2 weeks interval until 15 Jan.</td>
<td>6.06</td>
<td>97.830</td>
<td>13.50</td>
<td>0.783</td>
</tr>
<tr>
<td>7 irrigations at 2 weeks interval until 30 Dec.</td>
<td>5.84</td>
<td>84.380</td>
<td>14.41</td>
<td>0.766</td>
</tr>
<tr>
<td>6 irrigations at 2 weeks interval until 15 Dec.</td>
<td>5.54</td>
<td>79.970</td>
<td>15.50</td>
<td>0.683</td>
</tr>
<tr>
<td>6 irrigations at 3 weeks interval until 22 Jan.</td>
<td>5.74</td>
<td>83.430</td>
<td>13.91</td>
<td>0.616</td>
</tr>
<tr>
<td>5 irrigations at 3 weeks interval until 2Jan.</td>
<td>5.64</td>
<td>80.000</td>
<td>15.41</td>
<td>0.483</td>
</tr>
<tr>
<td>4 irrigations at 3 weeks interval until 15 Dec.</td>
<td>5.35</td>
<td>74.300</td>
<td>16.25</td>
<td>0.366</td>
</tr>
<tr>
<td>L.S.D. 0.05</td>
<td>0.19</td>
<td>5.167</td>
<td>1.25</td>
<td>0.068</td>
</tr>
</tbody>
</table>
REFERENCES


الجودة والمحصول في البصل المزروع بالبصيلات باستخدام معاملات رأي مختلفة

تحت ظروف اسيوط

شرين عفوب عطالة

قسم البساتين (خضرة) - كلية الزراعة - جامعة اسيوط


2008/2007 لدراسة تأثير المعاملات الري المختلفة على الابصال المزروع بالبصيلات

بهدف تحسين المحصول ووجوده. وكان الري كل أسبوعين وكل ثلاثة أسابيع مع اقفاي

الري قبل الحصاد ب 15 يوم، شهر، شهور ونصف، وكانت المقدرات المائية لكل المعاملات

ثانية (40 مم/3 حوض) في كل مرة.

وتلخص أهم نتائج الدراسة فيما يلي: 

- هناك نقص واضح في النسبة المئوية للاصلاح المزدوجة بزيادة الفترة بين الريات.

- تطبيق الري متاخرًا في موسم النمو لدى التزايد المحصول.

- الابصال التي اخذت 3 ريات وكان الري كل اسبوعين مع اقفاي قبل الحصاد ب 15

 يوم) أكبر طول للنباتات وأعلى وزن طازج للنباتات وأيضاً اعطت اعلى القمح لكل من

 متوسط وزن الابصال والمحصول الكلي بينما أعطت هذه المعاملة تأثير سلبي على جودة

 الابصال حيث أعطت اعلى نسبة منوية للاصلاح المزدوجة وأعلى فرد في الوزن أثناء

 التخزين واقل نسبة منوية للمواد الصلبة الذائبة الكلية.

- أعطت المعاملة (6 ريات خلال المواسم والتي كل اسبوعين مع اقفاي قبل الحصاد ب

 45 يوم) اقل نسبة منوية للاصلاح المزدوجة وقيم متوسطة لكل من قطر الابصال

  و متوسط وزن الابصال. وتمام المحصول الكلي، فقد في الوزن أثناء التخزين، نسبة المئوية

 للمواد الصلبة الذائبة الكلية.

قام بتحكيم البحث

كلية الزراعة - جامعة المنصورة

أ.د/ سمير طه محمد العفوي

كلية الزراعة - جامعة اسيوط

أ.د/ أبو المعارف محمد الضرماني

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